

3D Opal Photonic Crystals Grown on Patterned Silicon Platforms[#]

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Silica and PMMA opals have been grown on patterned silicon substrates as a step towards integration of 3D light emitters and 2D waveguides on a single chip. The main result is that opal growth has been achieved with a high degree of site selectivity, using capillary forces combined with suitable substrate designs and surface preparation.

Optical microscope images demonstrate the spatial selectivity on large scale with dye loaded PMMA. For further details both, PMMA and silica opals, are examined with scanning electron microscopy.

The opals grown in the structured silicon have been characterized by far-field and near-field spectroscopy and show clearly Bragg reflections and luminescence commensurate with the number of layers, the crystal order and the transitions expected in the emitting centers in a photonic crystal environment.

Optical spectroscopy results data and possible integration prospects will be discussed.

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